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BSI Standards Publication

Fibre optic communication system design guides

Part 4: Accommodation and utilization of non-linear effects

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National foreword

This Published Document is the UK implementation of IEC/TR 61282-4:2013. It supersedes PD IEC/TR 61282-4:2003 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee GEL/86, Fibre optics, to Subcommittee GEL/86/3, Fibre optic systems and active devices.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FIBRE OPTIC COMMUNICATION SYSTEM DESIGN GUIDES –

Part 4: Accommodation and utilization of non-linear effects

FOREWORD

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IEC/TR 61282-4, which is a technical report, has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition, published in 2003, and constitutes a technical revision.

This edition includes the following significant technical change with respect to the previous edition:

– clarifications on the compensation for nonlinear impairments with digital signal processing.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
86C/1166/DTR	86C/1189/RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61282 series, published under the general title *Fibre optic communication system design guides*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

FIBRE OPTIC COMMUNICATION SYSTEM DESIGN GUIDES –

Part 4: Accommodation and utilization of non-linear effects

1 Scope

This part of IEC 61282, which is a technical report, is intended to describe physically and analytically non-linear effects in fibre optic systems, their impact on system performance, and ways of minimizing the effects or using them to advantage. It contains some of ITU-T Recommendation G.663 [1] [1] with additional material. More details on applications are considered in [2] and networks in [3].

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60793-1 (all parts), *Optical fibres – Part 1: Measurement methods and test procedures*

IEC 60793-2 (all parts), *Optical fibres – Part 2: Product specifications*

IEC/TR 61292-3, *Optical amplifiers – Part 3: Classification, characteristics and applications*

3 Abbreviations and symbols

3.1 Abbreviations

BER	bit-error ratio
DCF	dispersion compensating fibre
DWDM	dense wavelength division multiplexing/demultiplexing
EDFA	erbium-doped fibre amplifier
FWHM	full width at half-maximum
FWM	four-wave mixing
FPM	four-photon mixing
IL	insertion loss
MI	modulation instability
OA	optical amplifier
OFA	optical fibre amplifier
ORL	optical return loss
OTDR	optical time-domain reflectometer
PDC	passive dispersion compensator
PDL	polarization dependent loss

[1] Figures in square brackets refer to the bibliography.